CHAPTER FIVE

ENGINE LOWER END

This chapter describes service procedures for the following lower end components:

1. Recoil starter.
2. Alternator cover.
3. Flywheel and starter clutch.
4. Gearshift linkage.
5. Reverse shaft assembly.
6. Oil pump.
7. Relief valve.
8. Oil strainer screen.
9. Crankcase and crankshaft.
10. Transmission shifting check.

One of the most important aspects of a successful engine overhaul is preparation. Before removing the engine and disassembling the crankcase, degrease the engine and frame. Have all the necessary hand and special tools available. Make sure the work area is clean and well lit. Identify and store individual parts and assemblies in appropriate storage containers.

Throughout the text there is frequent mention of the front and rear sides of the engine. This refers to the engine as it sits in the vehicle's frame, not as it sits on the workbench. Likewise, the references to the left and right sides of the engine refer to the engine as it is mounted in the frame.

Table 1 lists general engine specifications and **Table 3** lists oil pump service specifications. **Table 4** lists crankshaft service specifications. **Table 5** lists engine torque specifications. **Tables 1-4** are located at the end of this chapter.

SERVICING ENGINE IN FRAME

Many engine components may be serviced with the engine mounted in the frame. The following components can be serviced with the engine mounted in the frame:

1. Cylinder head.
2. Cylinder and piston.
3. Clutch.
4. Recoil starter.
5. Oil pump
6. Carburetor.

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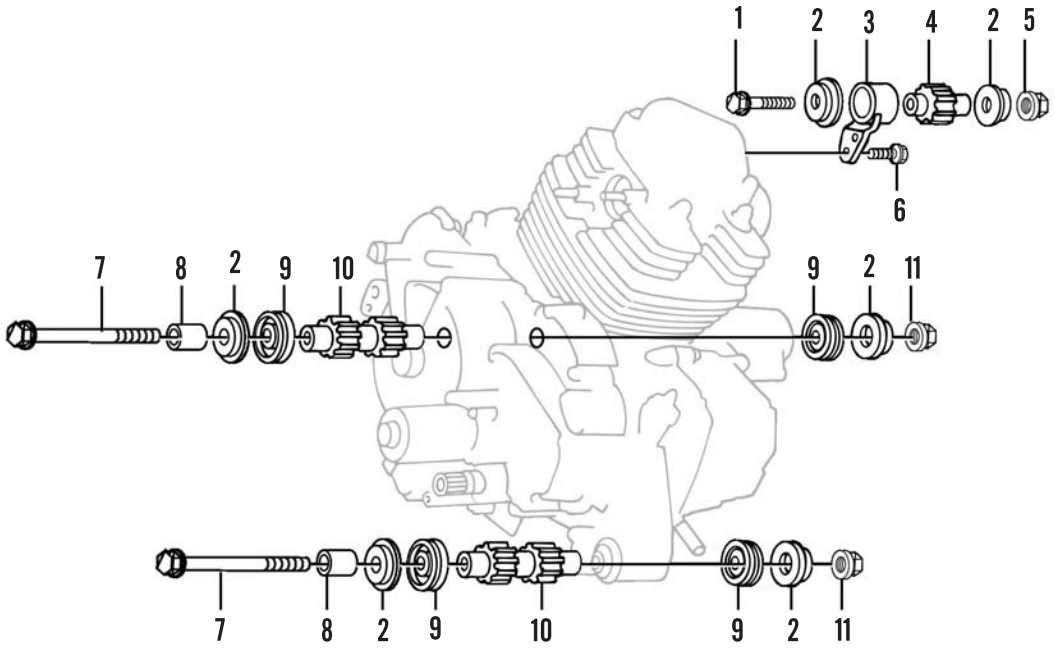
ENGINE MOUNTS



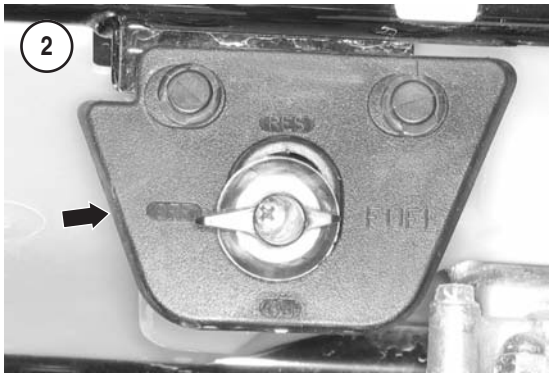
1. Bolt
2. Mounting rubber
3. Upper hanger
4. Inner mount
5. Nut
6. Bolt
7. Bolt
8. Spacer
9. Dust seal
10. Inner mount
11. Nut

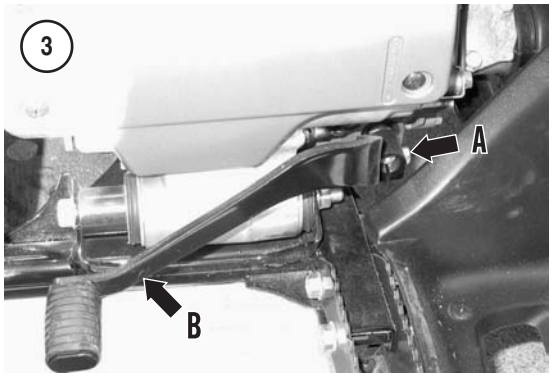
ENGINE

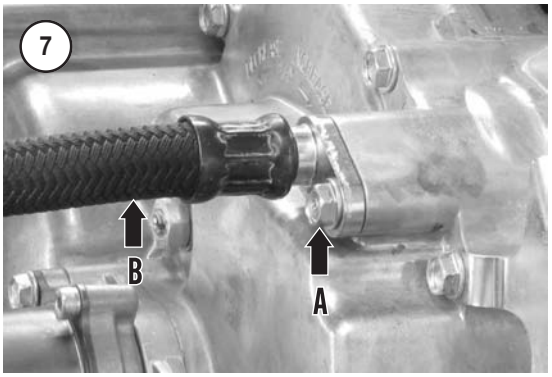
Refer to **Figure 1** when removing and installing the engine in the frame.

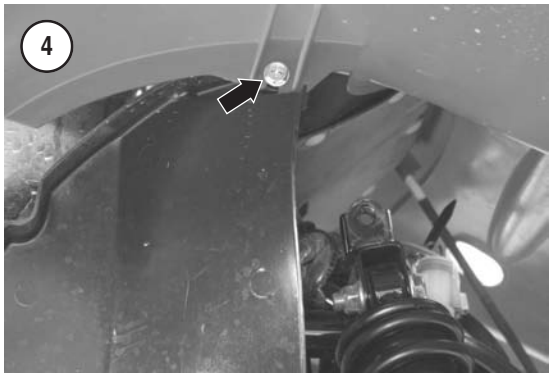
Removal/Installation

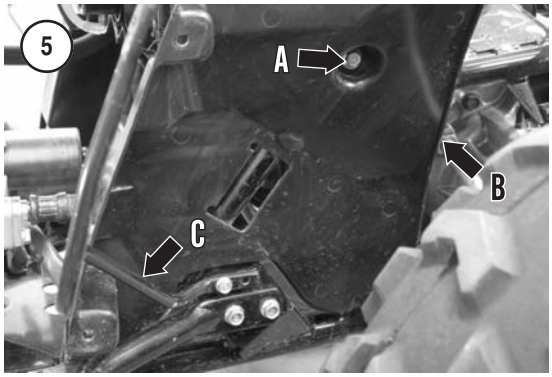
1. Park the vehicle on a level surface and set the parking brake.
2. Before disassembling the engine, perform a compression test (Chapter Three) and leak down test (Chapter Two). Record the readings for future use.
3. Remove the seat (Chapter Fifteen).
4. Disconnect the negative battery cable from the battery (Chapter Three).
5. Drain the engine oil (Chapter Three).
6. Remove the fuel tank and heat guard (Chapter Eight).
7. Remove the fuel valve panel (**Figure 2**).
8. On FM and TM models, remove the clamp bolt (A, **Figure 3**), then remove the gearshift lever (B).
9. On FE and TE models, remove the center mud guards (Chapter Fifteen).
10. On FM and TM models, remove the rear mud guards (Chapter Fifteen).
11. Remove the front mud guards (Chapter Fifteen).
12. Remove the self-tapping screw under the front fender on both sides (**Figure 4**).











13. Remove the inner fender mounting bolt (A, **Figure 5**) and remove each inner fender (B).

14. Remove the mud guard brace mounting bolt (C, **Figure 5**) and remove the guard braces.

15. Remove the carburetor (Chapter Eight).

16. Remove the exhaust system (Chapter Four).

17. Remove the engine covers on both sides (**Figure 6**).

18. Disconnect the oil cooler hoses from the engine as follows:

a. Remove the retaining bolt (A, **Figure 7**), then detach the oil hose (B) from each side of the engine. Cover the hose ends to prevent oil leaks and contamination.

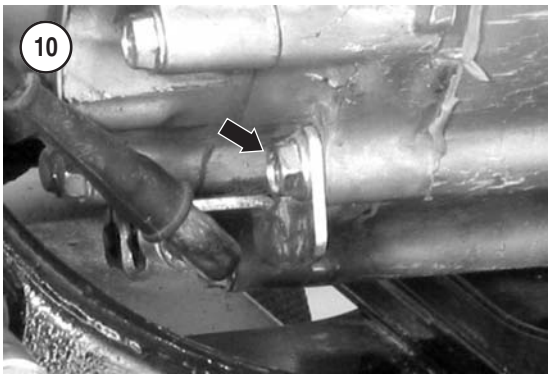
b. Remove the oil hose O-ring (**Figure 8**).

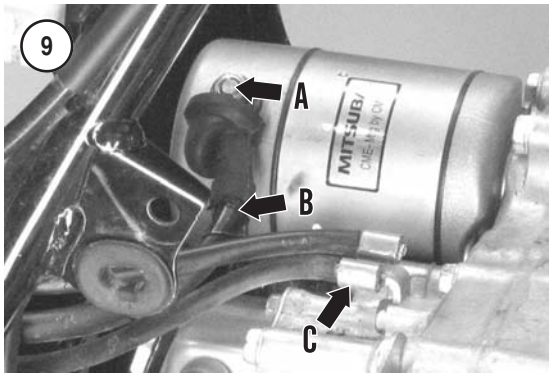
19. Remove the retaining nut (A, **Figure 9**) and disconnect the cable (B) from the starter.

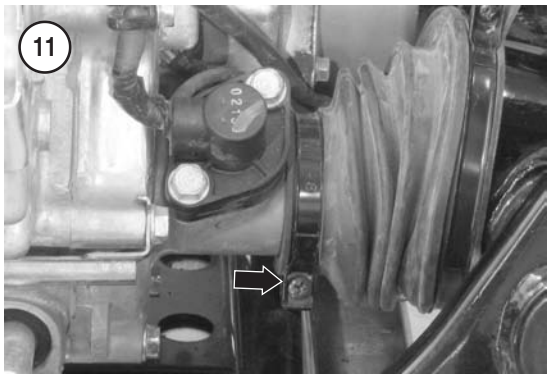
20. Remove the bolt and disconnect the two ground cables (C, **Figure 9**) from the engine.

NOTE

Refer to Chapter Nine to identify and disconnect the electrical connectors in Step 21.





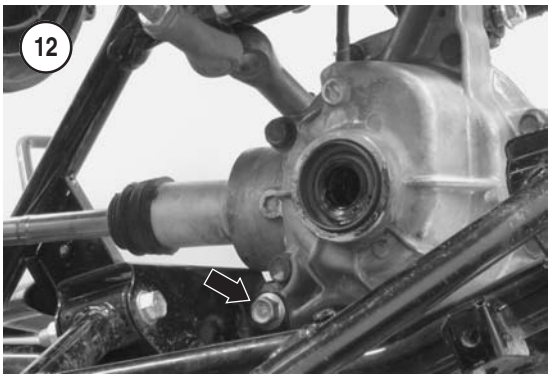


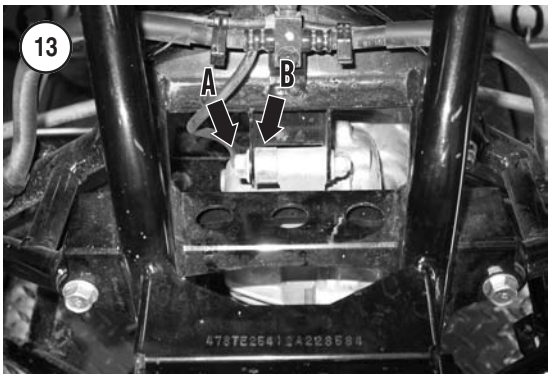
21. Disconnect the following electrical connectors:
    a. Speed sensor connector.
    b. Alternator/pulse generator connector.
    c. Neutral/reverse switch connector.
    d. Oil thermosensor connector.
22. Remove the brake pedal as described in Chapter Thirteen.
23. Remove the reverse control cable bracket mounting bolt (**Figure 10**), then disconnect the reverse control cable from the lever mounted on the engine.
24. On FE and TE models, remove the electric shift (ESP) reduction gears as described in Chapter Six.
25. Loosen the rear driveshaft boot clamp screw (**Figure 11**).

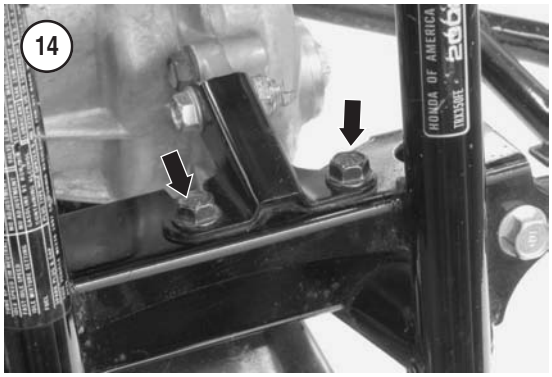
NOTE

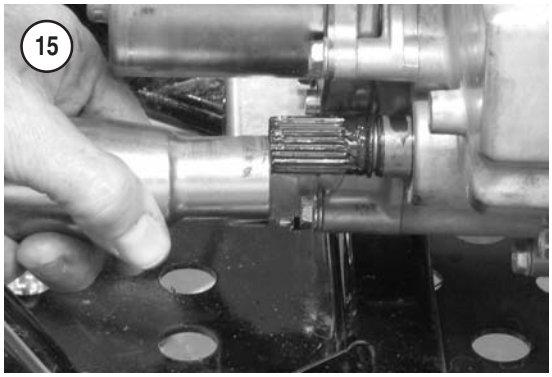
*The right axle was removed for clarity in **Figure 12**. It is not necessary to remove the axles in order to move the front differential forward.*

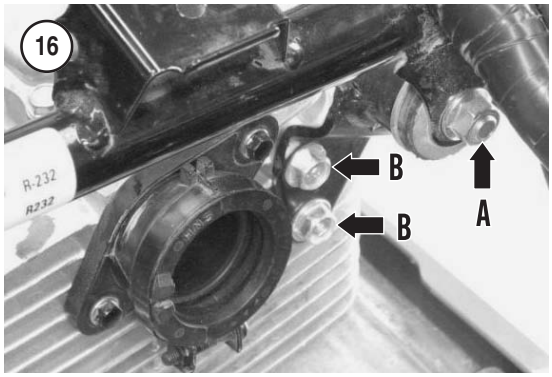
26. On FE and FM models, proceed as follows:
    a. Remove the lower front differential mounting bolt (**Figure 12**).

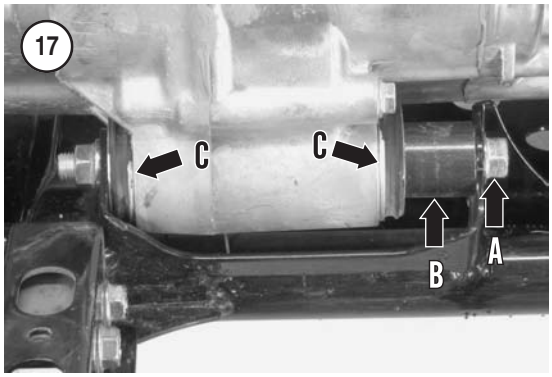


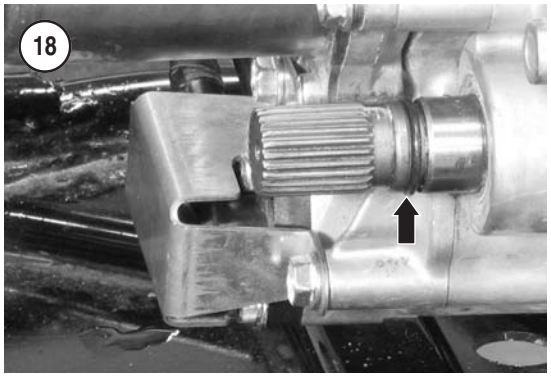












b. Remove the upper front differential mounting bolt (A, **Figure 13**) and spacer (B).

c. Remove the front differential front mounting bracket bolts (**Figure 14**).

d. Push the front differential forward, then push the front driveshaft forward so it disconnects from the engine output shaft (**Figure 15**).

27. Disconnect the spark plug wire.

28. Remove the engine upper hanger bolt (A, **Figure 16**).

29. Remove the engine upper hanger bracket bolts (B, **Figure 16**) and the upper hanger assembly.

30. Support the engine with just enough force to remove weight from the lower engine hanger mounting bolts while removing them in the following steps. Be sure to protect the frame and engine cases.

31. Remove the lower engine hanger bolt (A, **Figure 17**) and spacer (B) on both sides.

NOTE

Table 1 *lists the approximate weight of an assembled engine. Two people may be required to safely remove the engine from the frame.*

32. Move the engine forward to disconnect the universal joint from the rear driveshaft. Tip the engine to the right to lower the cylinder head, then remove the engine from the left side of the frame. Support the engine on a workbench.

33. Install the engine in the frame by reversing the preceding steps while noting the following:

a. Install a new O-ring onto the front engine output shaft (**Figure 18**).

b. Lubricate the universal joint, engine and driveshaft splines with molybdenum disulfide grease.

c. Make sure the splines on the engine rear output shaft and the rear driveshaft universal joint fit properly. Cocking will prevent the engine from sitting correctly in the frame.
d. Replace damaged engine mount fasteners.
e. Apply an antiseize compound to the shoulders on each engine mount bolt. This will help to prevent rust and corrosion.
f. Install the lower rubber mounting dampers so the larger diameter side faces the engine (C, **Figure 17**).
g. Install the upper hanger rubber mounting dampers so the wide side faces the bracket.
h. Install the spacer on each lower hanger bolt so the spacer is in front of the engine (B, **Figure 17**). Tighten the lower engine hanger bracket bolts (A, **Figure 17**) to 54 N•m (40 ft.-lb.).
i. Tighten the upper engine hanger bracket bolts (B, **Figure 16**) to 54 N•m (40 ft.-lb.).
j. Tighten the upper engine hanger bolt (A, **Figure 16**) to 32 N•m (24 ft.-lb.).
k. On FE and FM models, tighten the front differential mounting bracket bolts (**Figure 14**) to 22 N•m (16 ft.-lb.).
l. On FE and FM models, tighten the front differential lower mounting bolt to 44 N•m (33 ft.-lb.).
m. On FE and FM models, install the spacer on the front differential upper mounting bolt as shown in B, **Figure 13**. Tighten the mounting bolt to 44 N•m (33 ft.-lb.).
n. Check the electrical connectors for corrosion. Pack the connectors with dielectric grease before reconnecting them.
o. Fill the engine with the recommended type and quantity of oil; refer to Chapter Three.
p. Check throttle operation (Chapter Three).
q. Check the reverse selector cable adjustment (Chapter Three).
r. Check brake pedal free play (Chapter Three).

RECOIL STARTER

The recoil starter can be removed and installed with the engine mounted in the frame. The following procedures are shown with the engine removed for clarity.